THE DISRUPTIVE POTENTIAL OF SOFTWARE AS A SERVICE: VALIDATION AND APPLICATION OF AN EX-ANTE METHODOLOGY

Completed Research Paper

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Abstract

We address current discussions on the potential of cloud computing to disrupt the structures of the software industry by selecting, validating and further developing a method for ex-ante identification of disruptive innovations that we imported from innovation management theory into the information systems area. Based on a review of a previous forecast in the area of web applications, we could show that this method was able to predict the likelihood for web applications to pose a minor disruptive threat to incumbents in the industry. Furthermore, we adapted and modified this method and applied it to the cloud computing market through the example of CRM software and the firms Salesforce and SAP. Our results indicate that Salesforce's on-demand software products in the CRM market show a high disruptive potential but at the same time the method also reveals that SAP response strategy limits its possible failure to this disruptive threat.

Keywords: Disruptive Innovation, Disruptive Potential, Cloud computing, ICT, CRM Software, Web applications, Software as a Service, Ex-Ante Method
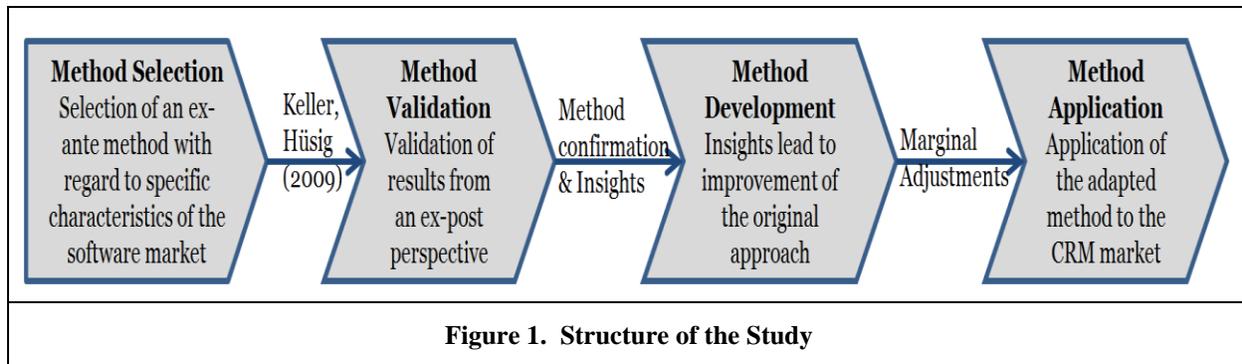
Motivation

There are currently heated discussions on the potential of cloud computing technology to disrupt the structures of the software industry (DaSilva et al. 2013; Sultan and van de Bunt-Kokhuis 2012). According to Anthony et al. (2008), disruptive innovations contribute to the creation of new products and services. Even though innovations seem to play a crucial role for the software industry, disruptive innovations also create existential problems for software companies. Well-established and traditional enterprises in particular face fundamental problems when it comes to changes in the industry (Christensen 1997). According to Adomavicius et al. (2008), predicting and understanding the effects of future technological developments on the value of present technologies is a major problem for firms making information technology investment decisions. A failure to adequately address this problem can result in organization resources being wasted in acquiring, developing, managing, and training employees to use technologies that are short-lived and fail to produce adequate returns on investment. They are not able to cope with new technology innovations and loose a high percentage of market shares, in spite of good managers running the company. The potentially disruptive cloud computing technology should be of high interest to researchers in the information systems (IS) community. But what are the crucial factors that determine a company's survival or failure?

Before we begin looking at solutions for how well-established software firms can handle such situations, we first have to take a step back. We have to find out if the technology in question has the potential to develop into a disruptive innovation. In this paper, we focus on cloud computing technology and especially on CRM (Customer Relationship Management) in the form of Software as a Service (SaaS). SaaS is considered to be an important element of cloud computing. The question raised is especially difficult to answer as experts and practitioners agree that this technology is still at the beginning of its life cycle.

Given the importance of the topics disruptive innovations, and information and communications technology (ICT), it is surprising that research usually focuses on either one topic or the other. On the one hand, there seems to be a lack of research concerning ex-ante methods for spotting and predicting potentially disruptive innovations. The research that focuses on Christensen's theory of disruptive innovations concentrates foremost on the ex-post analysis of disruptive phenomena in various industries (Govindarajan and Kopalle 2006). On the other hand, research indigenous to ICT industries usually neglects disruptive innovation phenomena. Rather, researchers assume that an ICT company faces a normal product distribution curve (De Marez et al. 2011; Mann 2009). External or internal shocks affecting the S-curve are not included in their standard models. We took this research gap as a reason to further explore potentially disruptive innovations in the ICT field. Therefore, we want to import this concept to the IS community and aim to contribute to the research by connecting different streams of literature.

First, we have to choose an appropriate ex-ante method. This is not a trivial decision as up until now no validated and safe alternative has been established in this area of research. Our starting point is a previous research project that analyzes the question of whether cloud based web applications pose a disruptive threat to incumbents or a disruptive growth opportunity for entrants in the application software industry (Keller and Hüsig 2009). The study used a novel method for the ex-ante identification of disruptive innovations. The results generated by the study are reviewed in this paper. If this method proves to be suitable and valuable for giving an appropriate estimation, we will adapt this method to our case and apply it to the Software as a Service market using the example of CRM software. As a result of insights gained during the method validation stage, we were able to further develop the method (see Figure 1). Using this approach, we can additionally address another research gap: We can check the explanatory power of an ex-ante method from an ex-post perspective concerning disruptive innovations.

Method Selection		Method Validation		Method Development		Method Application
Selection of an ex-ante method with regard to specific characteristics of the software market	Keller, Hüsig (2009)	Validation of results from an ex-post perspective	Method confirmation & Insights	Insights lead to improvement of the original approach	Marginal Adjustments	Application of the adapted method to the CRM market

Figure 1. Structure of the Study

We will investigate two main research questions:

1. Is the ex-ante method developed by Keller and Hüsig (2009) an appropriate tool for identifying potentially disruptive innovations in the software industry?

2. Do on-demand software products in the CRM market pose a disruptive threat to incumbents or a disruptive growth opportunity for entrants?

The remainder of this study is structured as follows. First, we give a brief overview of the disruptive innovation theory as well as a critique of its appropriateness and its usage for forecasting purposes. Next, we check Keller and Hüsig's (2009) results from an ex-post perspective and answer the question of whether their ex-ante method is suited to investigating the disruptive potential of innovations in the software industry. We then apply the developed method to our case—the CRM market—using the examples of Salesforce and SAP. Finally, we discuss the disruptive potential of CRM on-demand software products, which then leads to general recommendations for software incumbents as well as for entrants in the market. We will conclude this paper with conclusions, further research options, and an overview of the potential limitations of this study.

Theoretical Background

The Theory of Disruptive Innovation

Disruptive technologies are defined as technologies that disrupt an established trajectory of performance improvement, or redefine what performance means (Christensen and Bower 1996). Trajectory-disrupting changes are typically simple architectural innovations in the sense of Henderson and Clark (1990), and according to Christensen (1997), these new innovations can rarely be used in established markets, particularly in their early phase. He further explains that a disruptive technology initially underperforms the dominant technology in terms of mainstream attributes but has other features niche-market customers value. The potentially disruptive technology is initially not wanted by the leading firms' most profitable customers and thus is first commercialized in emerging and insignificant markets. Looking at potentially disruptive technologies from an investment perspective, they cannot be seen as a rational financial decision for leading firms. This is the reason why incumbents hold on to their old product line and try to develop and improve its performance steadily. Nevertheless, the new technology slowly but steadily improves, until it meets the low end of the mainstream performance standards and finally has the power to displace the dominant technology (Christensen and Rosenbloom 1995). At this point, new firms are able to enter the mainstream market that was originally occupied by the incumbent firm. History shows that the previously inferior disruptive technology becomes fully performance-competitive and captures a significant share of the incumbent firm's established market (Christensen 1997).

In summary, there are two preconditions for such a market disruption to occur: Firstly, performances overshoot on mainstream attributes of the existing product, and secondly, there are asymmetric incentives between existing business and potential disruptive business (Yu and Hang 2009). Finally, a disruptive technology is an innovation that helps create a new market and value network, and eventually goes on to disrupt an existing market and value network.

Although the term disruptive technology is widely used in business and technology literature, disruptive innovation seems a more appropriate term in many contexts since few technologies are intrinsically disruptive; rather, it is the business model that enables the technology to be disruptive (Christensen 2006). If it is the business model that enables the technology to be disruptive, contraries in the entrant's and incumbent's business models are a necessary precondition and lead to the change. In the entrant's business model, factors such as niche-market orientation, value chain configurations, innovation capabilities, and mainstream entry barriers are crucial. For the incumbent's business model, the incumbents' managerial dilemma on disruptive innovation and, therefore, their problems in changing value chains and orientations contribute to the fact that business models differ and cannot be changed easily. Additionally, Thatcher and Pingry (2007) state that "a firm cannot appropriately assess the business value of its IT investments without considering the type of product development the IT supports, the market structure in which the firm competes, and the type of IT in which the firm invests" (p.45).

Christensen and Raynor (2003) propose three different innovation strategies that firms might pursue when creating new-growth businesses: A sustaining innovation results in the performance improvement of the attributes most valued by mainstream customers. A company aims at the most profitable customers who are willing to pay for improved performance. Thus, this kind of innovation helps to improve profit margins by exploiting existing processes and cost structure, and makes better use of current competitive advantages. In contrast, a low-end disruption yields products that are good enough concerning traditional and low end performance attributes. Thus, the second type of innovation targets over-served customers by utilizing a new operating or financial approach. The third strategy is new-market disruptions. A product or service offers lower performance in traditional attributes but an improved performance in new attributes (e.g. simplicity and convenience). This strategy targets non-consumption, thus customers who historically lacked the money or skill to buy and use the product. The business model must make money at a lower price per unit sold. History shows that successful disruptors were positioned along the continuum of new-market to low-end disruption at their inception.

Criticism and the Problem of Ex-Ante Evaluations

Although Christensen's theory of disruptive innovation is known, discussed, and established in in the management literature (Tellis 2006), there is a heated discussion going on about the precise definition and refinement of disruptive innovation (Yu and Hang 2009). Additionally, several approaches exist alongside Christensen's theory, such as the diffusion theory (Rogers 1995) or the concept of radical innovations (Chandy and Tellis 1998). These theories try to address similar research questions. Although Chandy and Tellis (1998) establish the rival term "radical innovation" in the literature, this concept is more focused on the question: Why are some firms more successful at introducing radical product innovations than others? Moreover, an extensive body of literature exists concerning the diffusion theory (Plank 2007), yielding the question: Why use disruptive theory when there is a well-established and widely used diffusion theory in place? Summarizing relevant literature, the diffusion theory aims at innovations in general and does not have any implications for incumbents or entrants. Furthermore, disruptive theory tries to explain in more detail which situations and innovations lead to the failure of incumbents, which makes it more specific to our context. Mann (2009) states that alongside innovations offering new solutions for new problems, there are also innovations that offer new solutions for existing problems. He underlines that disruptive technologies displace existent technologies, even though they might not have reached their diffusion target yet. As a consequence, a second S-curve that radically changes the diffusion curve of the former technology starts. As diffusion theory is not able to model such situations, it is not appropriate for our research context.

Furthermore, the predictive use of disruptive innovation theory is subject to discussion. Yu and Hang (2009) state that Christensen (2006) has refuted the assertion of Danneels (2004) and Tellis (2006), who claimed that disruptiveness was defined post hoc. Other researchers, in contrast, have made efforts to address the predictive value of the theory better and suggest the concept of "disruptive potential" instead (Hüsig et al. 2005). The next section presents such a method, developed and applied by Keller and Hüsig (2009) to the web applications market. We chose their method as it corresponds to the specific characteristics of the software market and combines important perspectives.

Validation of the Ex-Ante Identification of Disruptive Innovations

Preliminary Work for the Methodical Framework

Keller and Hüsig (2009) identified that there is still "a lack of definite frameworks for the ex-ante identification of disruptive innovations" (p.1045). Thus, they developed a new approach in order to answer the question of whether web applications pose a disruptive threat to incumbents or a disruptive growth opportunity for entrants. In order to answer this research question, they built on the theory of disruptive innovations, network effects, and existing frameworks for the ex-ante identification of disruptive innovations. Aggregating previous forecasting approaches, Keller and Hüsig (2009) combined the following perspectives as the basis of their approach: The disruptive threats for incumbents (Rafii and Kampas 2002), industry change due to innovations (Christensen et al. 2004), and the disruptive potential of a technology (Hüsig et al. 2005). As a result of this procedure, they developed criteria sheets for what indicates a disruptive innovation as well as a trajectory map of the technologies' performance attributes. Multiple factors are included in the criteria sheets (see Tab. 1 & 2). Apart from the criteria themselves, a rating system of criteria (fulfilled/not-fulfilled/unknown), the distinction between entrants and incumbents as well as a process dimension were also included. The phases and their meaning are described as follows:

(1) Foothold market entry: The innovation grows successfully in a market niche.
(2) Main market entry: The innovation enters the mainstream market.
(3) Failure of incumbents: Incumbents fail to successfully implement the innovation themselves and lose their dominant position to the entrants.

The subdivision into phases gives credit to the dynamic character of the disruption and helps to assess the potential threat of a disruptive change in advance (Keller and Hüsig 2009). Thereby, it improves the understanding of which phases have to be or are already passed to finally lead to the incumbents' replacement. The phase perspective combines market specific, entrant specific, and incumbent specific factors. In addition, they took network effects into consideration as these are important dynamics in the software industry. As all criteria are noted in their disruption-positive form (Keller and Hüsig 2009), the more criteria are fulfilled, the more likely the chance that disruption will occur which increases the disruptive potential.

As mentioned above, the methodology consists of two parts. The second part concentrates on trajectory maps. Ideally, the trajectory of a disruptive innovation should fulfill the following criteria: the performance trajectory of the potentially disruptive innovation intersects the lower market demand, the performance trajectory of the established technology overshoots market demand, and the price trajectory of the potentially disruptive innovation intersects the price trajectory of the established technology from above or always remains below (Keller and Hüsig 2009).

Their analysis concluded that there is "a small likelihood for web applications to pose a disruptive threat to incumbents in the software industry. While web applications show a potential to satisfy market demand in established performance attributes, strong network effects in existing software products should give incumbents enough time to co-opt the innovation" (p.1044). As web applications can be viewed as a super ordinate group, their study specifically focused on Microsoft's desktop office applications and Google's web-based office applications.

As there is a time span of four years between the development of their method and the resulting findings, and our validation, we are able to evaluate the results from an ex-post perspective. This time frame should be large enough as the software market is a fast moving branch with short product life cycles (Li et al. 2010). Thus, in four years' time the industry incumbents and entrants have had enough time to react and adjust their strategies. For us, it is important to verify ex-post if the application and assessment of their method to office applications is correct. This validation process gives us the chance to learn from their mistakes and adjust the methodology when needed. Finally, we can then apply the method to our case—the CRM market.

Ex-post Validation for the Case of Web Applications

In this section, we want to answer our first research question: Is the ex-ante method developed by Keller and Hüsig (2009) an appropriate tool for identifying potentially disruptive innovations in the software industry? Additionally, we try to find the starting point of where we can further develop the methodology.

In order to give a valid answer to our first research question, we have to answer at the following sub questions: Do Google's web applications pose a disruptive threat to Microsoft? Do Google's web applications really show the potential to satisfy market demand in established performance attributes? Are there strong network effects in Microsoft's existing software products that give incumbents enough time to co-opt the innovation? We try to answer these questions using objective and publicly available statistics as well as report data.

The headlines of journal articles bear witness to the fact that the potential threat of web applications cannot be denied. Some Wall Street Journal titles include: "Microsoft, Feeling Google's Heat" (Rosenbush 2012) and "Microsoft Hits Back as Google Muscles In" (Ovide 2012).

Microsoft's Office currently holds 90% of the market share for business-productivity software (Ovide 2012). Furthermore, a study looking at German Internet users underlines Microsoft's existing power in the consumer market. Microsoft's Office Software holds 72% of the market share (Webmasterpro 2010). At first glance, this is a comfortable situation for the incumbent. However, for 73% of enterprises' IT decision makers, Google's web-based Office is currently viewed as the best alternative (Karcher and Brown 2011).

Encouraged by this study, Amit Singh, Google's vice president, said "Our goal is to get to the 90% of users who don't need to have the most advanced features of Office" (Clay 2012). This statement clearly shows that Google's web based application initially targets consumers at the low-end of the mainstream market. This is an indicator of a different business model compared to that of Microsoft and, therefore, an indicator for a potentially disruptive innovation. Google's strategy is to move up-market over time by persuading more and more consumers with improved performance features. Having identified differences in business models as a very important predictor for disruption, we try to give this very point more weight in our analysis.

As a reaction to this serious threat, Microsoft has created a Google Compete Team. This group of experts has been instructed to keep Office customers from switching to Google products (Rosenbush 2012). Microsoft's move can be interpreted as a defense strategy on behalf of their customers. On the one hand, Microsoft has to stop its customer base from switching to other suppliers while lock-in effects help in keeping existing customers (Buxmann et al. 2012). On the other hand, Microsoft must win new customers. Therefore they should build on existing network effects (Buxmann et al. 2012). Statistics show that these effects are still in place. Despite serious attacks from the opponent, Microsoft's market shares are still very high (90% and 72%).

One target of Microsoft's anti-Google offensive was Dominion Enterprises. They tried hard to persuade this company to choose its Office Suite – in vain. Dominion Enterprises instead installed Google Apps for its 4,000 employees. In the end, the company's chief information officer, Joe Fuller, said he was impressed, but Office 365 was more expensive than Google Apps, and it was "not as cool" as Google's software (Ovide 2012).

As a first intermediate conclusion, we can see that our data demonstrates the immense disruptive threat posed by web applications in the software industry. Furthermore, the example points out that Google has slowly been able to move up-market and to satisfy market demand in established performance attributes. Otherwise big companies such as Dominion Enterprises would not have chosen its product. This is an interesting insight as Google's strategy was to get the users who don't need most advanced features. Therefore we ask the question of whether Google is still focusing on the low end segment or whether they are further on their way up-market yet. To find an answer, we have to look more closely at the price aspect.

During the last few years, Google appealed foremost to small businesses and start-ups. Nevertheless, recent developments show that they are trying to snare larger enterprises. This is clearly an indicator that Google is moving up-market. One big issue is undoubtedly the price. In 2012, "Google charges $50 a year for each person using its product, a price that has not changed since it made its commercial debut, even though Google has added features" (Worstall 2012). Microsoft's Office suite, on the other hand, comes at a price of $400 per computer for businesses in 2013 (although companies pay less after negotiating a

volume deal). In addition, Microsoft's strategy is different as they are raising the prices for extra features and services. In summary, Google offers comparable products at $50 a seat to Microsoft's Office Suites at $400 a seat. Thus, the price plays an important role. Again we see an indicator for disruption as the price trajectory of the potentially disruptive innovation stays below the price trajectory of the established technology (Keller and Hüsig 2009). Additionally, there are extra features included in the new versions of both products. This gives Google the possibility to move up-market and supply mainstream market costumers with improved performance attributes.

Microsoft is battling hard against the opponent. The last few years have shown that established network effects were in favor of the incumbent. However, due to improved product performance and an aggressive strategy by Google, the situation for the incumbent has become dicey; a reaction was inevitable. With its product Office 2010, Microsoft is targeting businesses and home users, and has even integrated a free online component called Office Web Apps. Additionally, Microsoft now offers its online office suite to users via Facebook and has launched its own cloud version. This underlines the massive response to Google's threat. Google answered promptly. They gave the following advice to potential costumers: "If you're considering upgrading Office with Office, we'd encourage you to consider an alternative: Upgrading Office with Google Docs" (Fildes 2010).

Having examined all the information gathered about the web application market, we can now affirm the three sub questions that lead to our first research question.

We can confirm the predicted likelihood of web applications posing a disruptive threat to incumbents in the software industry. Keller and Hüsig estimated in 2009 a "small" potential threat. This is true for the market share. Microsoft still holds 90% for business-productivity software and 72% of the German internet user's Office Software. Nevertheless, we can state that the potential threat towards other criteria (e.g. product performance, the peoples' willingness to pay for further improvements) is obviously greater.

An explanation for this deviation is found in the fact that we are concentrating on Microsoft as an incumbent and Google as an entrant. Google is an exceptional company with huge financial assets. This enables Google to pursue an aggressive strategy to increase its influence on customers. Furthermore, Google already has experience in the software industry and is one of the big players in the ICT market. This extraordinary position gives Google the power to pose an enormous threat to Microsoft. Thus, from an ex-post perspective, it is not surprising that with Google in the market, there is more than a "small" likelihood of web applications posing a disruptive threat to incumbents.

We should take this very point into consideration when we analyze the CRM market using the example of SAP and Salesforce. We can certainly draw some parallels between our case and the office market as SAP and Salesforce are comparable giants in the software industry. We also have to bear this fact in mind as we deviate from Christenson's theory. Initially he focused on small start-ups as entrants to the market. However when investigating phenomena in the software industry, we cannot deny the existence of big players. Finally we can learn from these results that we need to distinguish between the potential threat of losing market shares versus the potential threat of other disruptive criteria, e.g., the size and different business models. This insight serves as a further development when it comes to the application of the method in the CRM market.

Returning to the sub questions, we also found that web applications display a potential to satisfy market demand in established performance attributes. The case of Dominion Enterprises shows that international companies count on the performance of new web applications. This is not surprising as back in 2009, Keller and Hüsig identified established performance attributes to be capable of satisfying market demand. Four years later, we observe that web applications offer desktop-like performance and are being introduced in large companies. Current studies show that the following attributes in particular can be viewed as promoting factors in the cloud computing market: Speed, flexibility, customer orientation, and reduction in enterprise capital IT budgets (Global Cloud Computing Survey 2010).

Finally, strong network effects in existing software markets give incumbents time to co-opt the innovation. Nevertheless, one could argue that Microsoft's reaction came late. As market data shows, Microsoft faces a hard battle. Existing network effects certainly contribute to Microsoft's comfortable situation. However, network effects are not permanent and irreversible dynamics. We should try to investigate if there are different dynamics in place concerning switching costs of mainstream versus new customers. Applying the

insight to the case of the CRM market, we have to investigate precisely how SAP is positioned in relation to the emerging market and how their roadmap strategy can be interpreted.

The analysis of market data shows that the developed method for the ex-ante identification of disruptive innovations is a suitable method for predicting future outcomes. Furthermore, we see possibilities for improving and developing the method. In the next section, we want to apply the method to the CRM market, keeping the lessons from the office web applications market in mind.

Application of Method to the CRM Market: SAP AG and Salesforce

According to Keller and Hüsig (2009), it is "not feasible to make a complete survey of the disruptive potential for the entire software industry" (p.1048). In order to address another segment of the web application market, we focus in the following on the CRM branch. Thus, we want to determine the disruptive potential that this kind of web application poses to software incumbents as well as the disruptive growth opportunity for entrants. We focus on the SAP CRM desktop application and the Salesforce CRM web application.

Technology and the CRM Market

Software as a Service (SaaS) is defined in multiple ways in scientific literature (Armbrust et al. 2010). Nevertheless, all definitions embrace the fact that software depicts all non-physical aspects of an application system, whereas service is defined as an output of a non-material product that delivers a non-material value to a customer (Vossen and Grob 2007). Buxmann et al. (2008) provide the definition that "SaaS [is] a distribution system of standardized software, where the software is hosted by the provider and made available as a service to customers over the internet" (p. 50). SaaS and cloud computing are often mentioned in the same context. This is because SaaS is considered to be an important element of cloud computing. While SaaS describes only the service of an application over the internet, cloud computing refers to the IT-infrastructure in terms of hardware and system software as well as the service of an application over the internet (Armbrust et al. 2010). The SaaS concept differs significantly from the traditional software concept. Traditional software demands a complete IT-infrastructure located with the customer. Furthermore, the acquisition of licenses, cost-intensive support, and maintenance contracts are common practice (Buxmann et al. 2008). SaaS opens up new possibilities for both vendors and customers. Customers wanting to utilize software on demand only need an internet connection as well as a computer that allows the use of the World Wide Web via a web browser. A lot of the burdens of traditional software, particularly cost-intensive updates and maintenance, are no longer an issue (Buxmann et al. 2008).

According to Gartner's CEO Survey (2012), CRM is rated as the most important area of investment to improve businesses over the next five years. Global CRM software revenue totaled $12 billion in 2011, a 13.5% increase from 2010. SaaS deployments continued their growth trend, accounting for 32% of the CRM software market in 2011. Furthermore, CRM vendors are increasingly tasked with tying workflows, analytics, mobile, and social components into an experience-driven solution that addresses the entire customer journey.

Today, SAP is Europe's largest and the world's fourth largest software company (Global Software Top 100 2011). SAP specializes in business software for all industries and company profiles. Salesforce, which is 27 years younger, is a pioneer of modern web applications and uses the internet as a platform for most of its products. In the Global Software Top 100 Edition (2011), Salesforce occupied position no. 26, and the company is one of the fastest growing companies worldwide (CNN Money 2011). Newspaper articles usually focus on these two companies as they are important players in the software industry. This is why we decided to choose these players as representatives for incumbents and entrants dealing with CRM product innovation. As previously stated, Christensen defines entrants as start-ups. However, we learned that within the software industry well-established and powerful companies play a crucial role when it comes to potential disruptive threats.

Analog to Keller and Hüsig (2009), we searched for qualitative as well as quantitative data from multiple sources in order to ensure a triangulation of findings (Yin, 2008). The triangulation of multiple data sources provides a strong foundation for the analysis. Potential data sources were found from a wide range of industry magazines and newspaper articles (e.g. Fildes 2010), weblogs (e.g. Grohmann 2012), companies' annual reports (e.g. SAP AG 2012a), companies' announcements and publications (e.g.

Salesforce 2013), studies (e.g. SAP AG 2008) and official statistics (e.g. Webmasterpro 2010). Searching and using multiple sources of data and ensuring data triangulation emphasizes the reliability and validity of our qualitative research (Huberman and Miles, 1994). The data was discussed by the authors and analyzed by pattern-matching to establish a chain of evidence until a common view was reached and by that high internal validity ensured (Yin, 2008). As we documented our evaluation transparently in the text and by public data sources, we also aimed for maximal reliability. In order to generate comparable results, we compiled the company profiles and marked our results separately for the entrant and incumbent in the disruptive criteria sheet. In order to specify the different strategies, business models, and CRM products, we will introduce the two companies and their different offerings in the next sections.

SAP AG

Founded in 1972 in Walldorf, Germany, SAP currently has more than 109.000 customers and total revenues of 14.233 billion EUR in 2011 (SAP AG 2012a). The software vendor focuses on CRM as well as on other fields of business software like enterprise resource planning (ERP) software.

SAP CRM is an independent segment within the SAP Business Suite, and its functionalities are based on an independent software and server architecture. SAP CRM can therefore be applied in various network environments. For the full use of its potential, integration in the entire SAP suite is advisable. Due to its extensive functionalities, SAP CRM covers all areas of CRM, such as administrative functions, budget and revenue planning, multi-channel management of marketing, etc.

SAP's goal is to achieve high customer satisfaction. Based on a 1 to 10 scale, a score of 7.7 in 2011 assesses overall customer satisfaction (7.6 in 2010 and 7.7 in 2009) (SAP AG 2011). In 2012, SAP implemented incentives to even exceed customer expectations. This will lead to some customers being over-satisfied in the future. The company wants to achieve a sustaining customer relationship and enhance loyalty (SAP AG 2011). Some consumers do not appreciate on-demand software, mainly because of security concerns. Some companies saw the level of information security risk drop down to 69% with SAP's software (SAP AG 2008). However, the market for on-demand software does not appear small or irrelevant. Market data indicates a high growth potential. This has led SAP to buy companies that already possess the new technology (Hardy 2011). Thus, SAP has recently begun moving towards the SaaS model. With SAP CRM OnDemand, SAP has entered into the new market, being joined along the way by even more competitors. Furthermore, we see a lot of consolidation activity (Ricadela 2012). Companies such as Microsoft, Oracle and SAP are buying other companies already offering SaaS. Thus, they acquire the necessary technological know-how and match their products with new offers. In the case of SAP, all cloud-related supplier assets are consolidated. They will operate as an independent business under the name "Ariba, an SAP company." (SAP AG 2012). This reaction to the potentially disruptive innovation shows that SAP is aware of the emerging market. This observation is in line with the fact that established performance attributes are shifting. Nowadays it is important to work in groups and in real time as well as to have information from Twitter, the Web, and internal documents at your fingertips (Bort 2012). The place of work is no longer located only on company premises; due to mobile devices, it can be anywhere. SaaS is the answer to this shift in work behavior. Furthermore, switching costs are seen as a crucial factor. In the SaaS world, it is easy for customers to switch. If they do not like a service, they can stop paying and move on. This is fundamentally different to the on-premises world. Upfront commitment is often accompanied by hardware and other software upgrades. It is the initial capital commitment plus implementation services that keeps buyers locked into suboptimal solutions (Howlett 2011). At the moment, customers are still locked in. However in light of the demand for a flexible and fast moving environment, only time will tell if customers will decide in favor of an on-premises solution. According to Maisto (2012), "SAP has branded itself globally as the powerhouse solutions provider behind powerhouse companies. But aware of the small- and midsize-enterprise (SME) opportunity that's growing with the popularity of flexible cloud-based solutions, SAP hosted an SME Summit at its New York office to get out a new message: We do small, too." Thus, the company is not fleeing to premium segments but is keeping its eyes open for new trends and ideas. Due to these observations we came to the conclusions represented in Table 1 - the criteria sheet for the incumbent, SAP.

SAP is traditionally an on-premises supplier. However in 2007, they jumped on the bandwagon and invested in cloud computing. The SAP Sales On-Demand and the new functionalities in the SAP Cloud are available upon request. Cloud features serve as a basis for the implementation of social media capabilities

and internet-specific analysis tools (SAP AG 2013). Thus, SAP is an incumbent offering the potentially disruptive technology itself. This reaction can be interpreted as a response strategy. The question is whether this response strategy is in line with theory. The key word here is cramming: "Competing against non-consumption requires clearing a low hurdle. When companies try to compete against consumption, they must produce a better product to interest consumers already consuming a competing and adequate product. Unfortunately, when faced with a disruptive innovation, companies almost always invest to morph the innovation into a product that better suits the needs of their current customers rather than target a new set of non-consumers. We call this phenomenon 'cramming'" (Christensen et al. 2001, p.31). Hence, we have to analyze whether SAP is targeting new or established consumers with its on-demand strategy. If the response strategy is in line with the theory and targets foremost new customer segments, Salesforce's disruptive potential decreases.

Table 1. Criteria Sheet SAP AG				
Phase	**Incumbent**	**Yes**	**No**	**Un-known**
Foothold Market Entry	Some customers are over-satisfied or non-consuming	x		
	Main customer segment does not appreciate entrant's products	x		
	Market for products based on potentially disruptive innovation appears small and irrelevant		x	
	Total Phase	**2**	**1**	**0**
Main Market Entry	Established performance attributes are shifting	x		
	Customers are unwilling to pay for further improvements along established attributes			x
	Switching costs are low		x	
	Total Phase	**1**	**1**	**1**
Failure of Incumbent	Products matching entrant's offer are not added		x	
	Incumbent is fleeing to premium customer segments		x	
	Potentially disruptive innovation is not implemented in separate organization		x	
	Total Phase	**0**	**3**	**0**
	Total	**3**	**5**	**1**

SAP CRM On-Demand is a flexible and customizable cloud solution. SAP's On-Demand CRM software uses the same code as the MySAP CRM suite. This presents an advantage for users and administrators who are already familiar with SAP products. In addition, it allows the two solutions to work together in a hybrid form. As the application comes with a price of $75 (month/user) for Sales Force Automation, marketing, or service, or $125 per user for all 3 modules, it is comparable to alternatives in the on-demand market. However, there is a minimum of 100 users. The company has chosen not to manage its own data center and relies instead on IBM hosting for software delivery. The SAP on-demand software mainly targets its existing SAP customers. Apart from this strategy, SAP tries to pursue medium-sized organizations (Online-CRM 2013).

These facts make it clear that SAP is targeting its current consumers as the product is compatible with MySAP CRM suite. Furthermore, SAP tries to prevent current consumers from switching to other companies offering on-demand products by charging a comparable price. They want current customers to get used to the SAP on-demand product and gain a foothold in the market. Thus, SAP does not particularly target new customers. According to the theory, this is a logical (and predicted) step, but it does not decrease the potentially disruptive power of competitors.

Salesforce

Founded in 1999 in Delaware, USA, Salesforce currently has more than 100.000 customers and total revenues of 1.8 billion USD in 2011 (CNN Money 2011). The SaaS vendor focuses on CRM software. Furthermore, it does not only provide SaaS, but also runs the IT-infrastructure for SaaS.

Salesforce's CRM value proposition equates to the general promises of SaaS: Cost reduction, decreased complexity, accessibility, and usability (Buxmann et al. 2008). As the company offers an on-demand product, clients can control costs and pay only for the applications they need. New and updated applications are easily provided via the AppExchange platform (Salesforce 2013). Data security and fewer features are not the only crucial factors surrounding CRM on-demand performance. The internet speed as well as the availability of an internet connection and server access is challenging. Incidents have been reported of users not being able to access their services or data (Grohmann 2012). The current business model mainly addresses new customers in the unsaturated market. Salesforce sees itself as a visionary and a market leader, which increases its profile and facilitates the acquisition of this specific costumer segment (Maos 2011). This attitude allows for experimentation. The founder and CEO Marc Benioff fosters innovating from within as well as acquiring external know-how. He acquired a total of 24 firms and admits that not all have succeeded. However, he is okay with failure, because "that's part of risk-taking" (Forbes 2012). Furthermore, small and medium sized companies are choosing to switch from established on-premises players to Salesforce as they do not require extremely complex solutions for their businesses (Barret 2012). This shows that over-satisfied customers consider Salesforce to be an adequate alternative. Developers select users to test beta versions of a package before rolling it out across all users (Salesforce 2011; Büst 2010). Only if the customers are satisfied with new features will they be adapted in the release version—new features normally come out three times per year (Salesforce 2012). Strategic resources such as capital are accessible as Salesforce has been a listed company since 2004 (NYSE Euronext 2013). Salesforce even exceeded Wall Street expectations (Stock price at $ 167.21 on 27th of February 2013), and its investors benefited greatly (Barret 2012). Salesforce CRM software is compatible with standard browsers and operating systems. With no specific software or hardware to install, customers can use their own equipment. However, Salesforce's competitiveness in the market is restricted because there is a lack of compatibility with SAP's proprietary standards. The product is available online to anyone. Furthermore, no matter which edition of Salesforce CRM is selected, the consumer joins more than 100,000 other users (Salesforce 2012). Additional functionalities such as Chatter provide a bridge between different company departments and an expanding ecosystem of partners is notable (Howlett 2010). Salesforce exclusively uses the internet as its distribution channel and consequently avoids any potentially restricted access from subcontractors. The business model is significantly different compared to that of incumbents because of their pay-as-you-go service, the innovative and forward-looking attitude as well as the fan-like community (Berg 2012). Thus, Salesforce has been able to pull both larger companies as well as growing start-ups away from their current CRM supplier (Berg 2012). Specific processes in on-demand companies differ to those of on-premise companies. An example of this is found in the high maintenance costs of the on-premise software and updates (Howlett 2010). Salesforce provides upgrades and maintenance over the internet. This is an advantage, especially for smaller but fast growing enterprises. Salesforce is currently targeting the market for small business and is trying to get a foothold in the main market. Due to these observations we came to the conclusions represented in Table 2 - the criteria sheet for the entrant, Salesforce.

Looking at its CRM product, we see that programming, infrastructure, and all user activities are located in the cloud. For standard solutions, there are large numbers of prefabricated modules that are connected in a "point and click" process in a complete system. Salesforce guarantees via Web API's (application programming interface) the trouble-free integration of additional programming and in-house software upgrades for cloud computing. The system is compatible with Windows PCs, mobile operating systems, and mobile devices. Support and apps for Mac computers are provided by the developer community. Furthermore the system supports social media. Salesforce CRM simultaneously offers a project-related platform in order to work with external partners. In the cloud, safe and confined spaces are definable (Salesforce 2013).
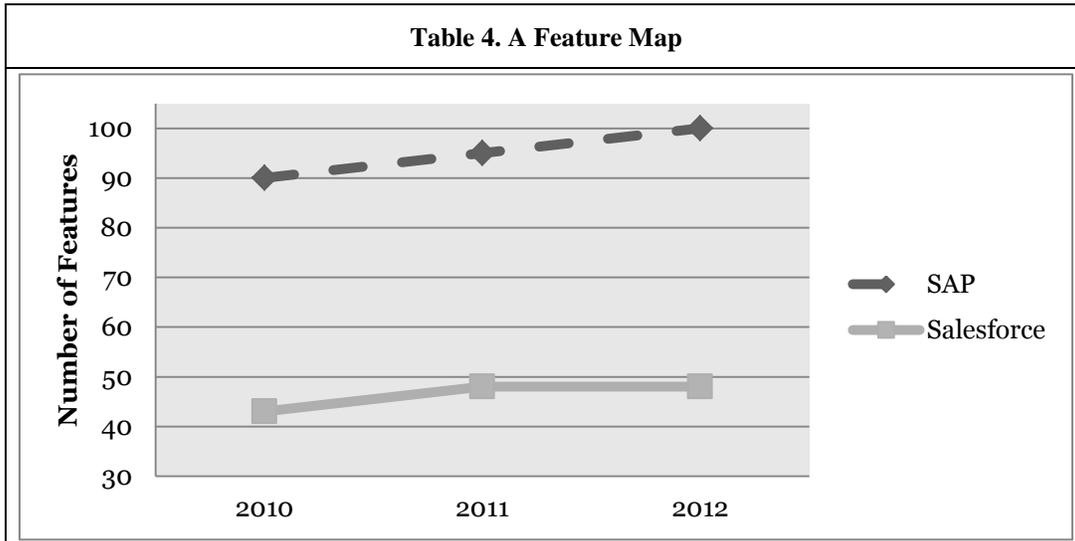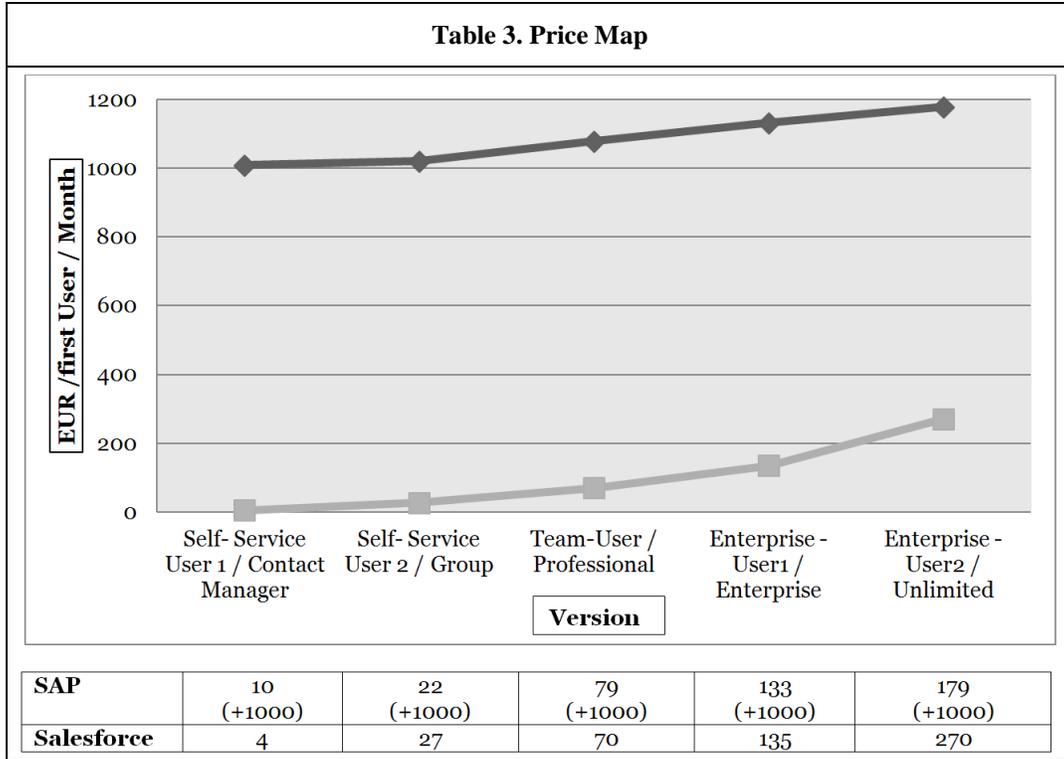
The following price map (Tab. 3) compares the two offerings. Saleforce offers five different editions of its Sales Cloud solution: Contact Manager, Group, Professional, Enterprise, and Unlimited. We take the SAP Business ByDesign with integrated CRM module for comparison because for the full use of the

CRM on-demand product, the integration in the entire SAP suite is advisable (see subsection SAP AG). The price depends on how many name-user licenses you need and which category you choose: Self-service user 1/2, team-user, or enterprise users 1/2. For the implementation of additional services, separate costs are charged. The monthly subscription fee is 1.000€ (SAP AG 2013a). Thus, the price curve is far beyond Salesforce's price curve. Because of the limited data available, we can only provide an up-to-date overview. Normally trajectory maps present data over a certain period of time. In the present case, we can only track Salesforce's data over the last few years. Thus, this price map shows a static price comparison. With Salesforce, we can observe that the price remained stable during the last few years. According to Christensen, the price of the entrant is always below the incumbent's price. This is true for the current situation. In this respect, we can state that our observation is in line with the Christensen theory.

Table 2. Criteria Sheet Salesforce				
Phase	**Entrant**	**Yes**	**No**	**Un-known**
Foothold Market Entry	Products perform worse based on established attributes	x		
	Products are cheaper, simpler, more comfortable or more reliable	x		
	Products address current non-consumers	x		
	Profitable business model targeting over-satisfied customers	x		
	Investors allow experimentation	x		
	Total Phase	**5**	**0**	**0**
Main Market Entry	Products are based on standard components	x		
	Strategic resources (licenses, capital, etc.) are accessible	x		
	Network for potentially disruptive innovation is expected to be large	x		
	Potentially disruptive innovation is compatible with existing network		x	
	Total Phase	**3**	**1**	**0**
Failure of Incumbent	Business model is significantly different	x		
	Processes are significantly different	x		
	Value network has a low overlap	x		
	Total Phase	**3**	**0**	**0**
	Total	**11**	**1**	**0**

Hui and Tam (2002) state that it is also important to look at the number of functions that are incorporated into the software apart from the focus on traditional competitive dimensions, such as price or quantity. In order to achieve comparable results for the feature trajectory map (Tab. 4), we focus on Salesforce's Enterprise version and SAP's CRM Sales product. In the past years, market demand has increased. Software firms produced a variety of packages in response to this demand and provide a large number of features (Jadhav and Sonar 2009). In 2012, SAP's on-premises product includes 100 features (SAP AG 2012b) while Salesforce's on-demand product has 48. Both companies have steadily enriched their offer. For Salesforce, we see 5 additional features in the Enterprise version compared to 2011 and 2010 (Salesforce 2012a). SAP does not provide any exact numbers, as they only announced they would be integrating additional features in the CRM product (SAP AG 2008a).

Table 3. Price Map

	Self- Service User 1 / Contact Manager	Self- Service User 2 / Group	Team-User / Professional	Enterprise - User1 / Enterprise	Enterprise - User2 / Unlimited
SAP	10 (+1000)	22 (+1000)	79 (+1000)	133 (+1000)	179 (+1000)
Salesforce	4	27	70	135	270

Table 4. A Feature Map

Results

Analyzing the price and feature trajectory map (Tab.3 and 4), we see that the results are in line with Christensen's theory. The entrant's price remains below the incumbent's price and the number of features offered by the on-demand product reaches market demand while staying way behind the on-premises offer. The results of the criteria sheets (Tab.1 and 2) suggest that Salesforce is strategically well positioned. Nearly every criterion is fulfilled, resulting in the best conditions for disrupting the CRM market. However, we also see that SAP has fought hard against disruption. SAP is aware of the new trends and innovation in the market. Right now, the chances of both companies surviving are high, and it is unlikely that SAP will disappear because of the disruptive innovation. Although both companies focus foremost on

their target customers, they are trying to broaden their horizons, and the CRM market is changing as both parties invest in on-demand offerings. At this very point it is important to underline that there is no exact score of yeses and no's that is needed to get to this result. The analysis process is about the potential and probability of disruption and not the final result which is disruptiveness. Instead, it transforms a well informed qualitative analysis in an aggregated result in form of a disruptive potential index value that is superior to a gut feeling analysis and provides a trend indication. However, so far there is no clear indication of a specific threshold value due to the lack of sufficient empirical testing of the suggested framework. This paper is a step into this direction.

Aside from this result, we wish to address some further insights. First, we support the idea of taking big players as entrants into consideration when analyzing parts of the software industry, even though this implies a deviation from Christensen's original theory. Surely this is a question of the period of analysis as some years ago Salesforce was also a start-up with disruptive potential. In the next section, we will focus on this second insight more explicitly.

When considering the growth opportunity for entrants, we have to bear in mind that we are analyzing a disruptive process. We are referring to Salesforce as an entrant that has the potential to disrupt the CRM market. Big players such as these possess perhaps even more disruptive potential as they have greater financial assets. In recent publications, Christensen has also seen this potential. He has identified companies with disruptive roots of success. According to his study, Salesforce is a company with inexpensive, simple internet-based systems and therefore it "is disrupting the leading providers of customer relationship management software" (Christensen 2012). The company's origins can be seen as a new-market disruption. However there are also start-ups in the market. The question is whether we can transfer our results to these small and medium sized companies. Christensen originally defined entrants as start-up companies, thereby indicating that they have a disruptive potential. Therefore it is important to underline that disruption is an ongoing force that is always at work, meaning that disruptors in one generation become disruptees later. This means that Salesforce has the potential to disrupt SAP, but, at the same time, the company has to watch out for start-up companies trying to disrupt them.

In addition we want to underline, that the current rating scheme applies to an one-incumbent and one-entrant situation as well as to companies that are very big. First, one could argue that the framework should work in situations where there is an incumbent faced with multiple entrants. Second, it is questionable whether such big companies represent typical Software as a Service companies. However, the validation process of the Keller and Hüsig (2009) study which also worked with an one-incumbent one-entrant situation and big companies representing the market, showed acceptable results, we applied this framework also to our case. Moreover, in cases of multiple entrants and incumbents it could be feasible to build categories of similar firms such as strategic groups or choose "typical" firms and use our framework analogically.

A third, more methodological contribution is the frameworks adjustment. Concerning the differences between our framework and that of Keller and Huesig (2009), we waived the aspect of "coordination costs" in the incumbents' criteria sheet and included the aspect of "non-consuming." This addition targets two groups: SAP customers who do not use all possible features because of the extensive range of functions and non-consumers. The second group is particularly important as this group was completely absent in the previous framework. We view this as a much needed improvement because this aspect touches on the option of new-market disruption. Due to the validation phase, we gained some insights. For example, Keller and Huesig (2009) tried to apply the developed framework on big players in the market although this was a deviation from Christensen's original theory. He suggests analyzing only start-up companies. However, we saw that this deviation works out well in the case of the software industry. Thus we also included the idea in our framework.

Discussion, Conclusion and further Research

Our results show that the ex-ante method developed by Keller and Hüsig (2009) is an appropriate tool to identify and qualify the disruptive potential of IT innovations in the software industry by analyzing the major players of on-demand and on-premises software products in the CRM market in the emerging context of cloud computing. In order to validate the appropriateness and its utilization for forecasting the disruptive potential of IT innovations, we examined the results of Keller and Hüsig (2009) from an ex-post perspective and answered the question of whether their ex-ante method was indeed suited to investigating

the disruptive potential of innovations in the software industry. Our reexamination of their forecast results revealed that the developed method for the ex-ante identification of disruptive innovations was a suitable method for predicting future outcomes in the area of web applications. There has been a constant demand for the reexamination of forecasts on disruptive technologies in the literature on disruptive innovation theory (Christensen 2006; Danneels 2004). With a time span of approximately four years between both studies, the predicted likelihood of web applications posing a minor disruptive threat to incumbents in the software industry was supported. Using the market share of the players as an indicator of disruptiveness, we found that Microsoft still holds 90% for business-productivity software and 72% of the German internet user's Office Software. Nevertheless, we can state that the disruptive potential concerning other criteria (e.g. product performance, the peoples' willingness to pay for further improvements) is still significant from our perspective. In the validation process, we also modified and improved the original approach marginally by dropping the aspect of "coordination costs" in the incumbents' criteria sheet and including the aspect of "non-consuming." These findings also contribute to the ongoing debate on the predictive power of the theory of disruptive innovation and related methods of forecasting (Hang et al. 2011; Govindarajan and Kopalle 2006; Klenner et al. 2013).

Building on this knowledge, we imported and leveraged Christensen's (1997) innovation management theory on disruptive innovation into the IS area and addressed an important question pertinent to the use of IS, the value that they create, and their impact: Do on-demand software products in the CRM market pose a disruptive threat to incumbents or a disruptive growth opportunity for entrants? We were able to show that the modified method developed by Keller and Hüsig (2009) can also be used as an appropriate tool to identify and qualify the disruptive potential of the major players of on-demand and on-premise software products in the CRM market in the cases of SAP and Salesforce. The results using the method indicate that Salesforce's on-demand software products in the CRM market show a high disruptive potential but, at the same time, the method also reveals that SAP's response strategy to this disruptive threat limits its possible failure. This result is in line with the theory of Christensen et al. (2004) on adequate response strategies to potential disruptions. Based on this insight, our method would point toward a future scenario in which the CRM market would be dominated by SaaS (technological substitution) but the firm structure would be less affected (absence of simultaneous major firm substitution). However as Madjdi and Hüsig (2011) pointed out, this future scenario might be limited by the firm heterogeneity in the incumbent field, where less prepared and resourceful firms will still be disrupted and technological substitution equals firm substitution in these cases. On the other hand, there might also be some alternative strategic choices for helping less resourceful incumbents to survive if the demand heterogeneity allows them to retreat to stable and defendable niche-markets (Adner and Snow 2010, 2011). In our case, that would still lead to the conclusion that both players will play a dominant role in the on-demand software part of the CRM market in the future.

Further research could be expanded to more firms to overcome the limitations of the firm selection and address the firm heterogeneity in the incumbent field in a more comprehensive empirical study. In this process, the role of the resourcefulness and alternative response strategies in the disruptive potential could be further explored. The demand heterogeneity or the disruptive susceptibility in the sense of Klenner et al. (2013) of the CRM market could also be analyzed in order to evaluate its readiness for disruptive innovations or retreat strategies. Moreover, the timeframe of our study could be expanded to cover the full history of the CRM market and SaaS, or to other market contexts. Finally, the method's abilities to assess the disruptive potential of the entrant could be further enriched by including the concept of the extendable core—the aspect of the business model of the entrant that allows the disrupter to maintain its performance advantage as it develops up-market to address more and more demanding customers (Wessel and Christensen 2012). Based on this additional insight, the method presented here could be further tested, improved, and developed.

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